



Evaluation #

200433-I

Safety & Buildings Division  
201 West Washington Avenue  
P.O. Box 2658  
Madison, WI 53701-2658

## Wisconsin Building Products Evaluation

Material

Insulated Concrete Form

Manufacturer

Phoenix Systems & Components, Inc.  
P.O. Box 460967  
Papillion, NE 69046-0967

---

### SCOPE OF EVALUATION

**GENERAL:** This report evaluates the use of the insulated concrete form wall system, manufactured by Phoenix Systems & Components, Inc., evaluated as permanent formwork and insulation system for reinforced lintels, exterior bearing and non-bearing walls, and foundation walls. The Phoenix Systems & Components, Inc. insulated concrete form wall system was evaluated for safety requirements of the foam plastic and structural requirements for the codes listed below.

Comm requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1- & 2-family dwellings:**

- **Foam Plastic:** The Phoenix Systems & Components, Inc. insulated concrete form wall system was evaluated in accordance with the fire safety requirements of **s. Comm 21.11**.
- **Structural:** The Phoenix Systems & Components, Inc. insulated concrete form wall system was evaluated in accordance with the structural requirements of **ss. Comm 21.02, and 21.02(3)(c)**.

The **IBC** requirements below in accordance with the current **Wisconsin Amended ICC Code:**

- **Foam Plastic:** The Phoenix Systems & Components, Inc. insulated concrete form wall system was evaluated in accordance with the fire safety requirements **ss. IBC 2603.1, 2603.2, and 2603.3**.
- **Structural:** The Phoenix Systems & Components, Inc. insulated concrete form wall system was evaluated in accordance with the requirements of **IBC Chapter 16**.
- **Formwork:** The Phoenix Systems & Components, Inc. insulated concrete form wall system was evaluated in accordance with the formwork requirements of **s. IBC 1906**.

**Note:** Structural calculations shall be submitted (job-to-job basis) in accordance with IBC Chapter 16 for Live, Ground Snow, Roof, Wind, and Seismic Loads.

## **DESCRIPTION AND USE**

**General:** Phoenix Systems & Components, Inc. insulated concrete form is manufactured using 100% modified expanded polystyrene from one of the following manufacturers Plymouth Foam and SCA North America. The forms are used as permanent formwork for structural concrete load bearing and non-load bearing residential and commercial, below- and above-grade walls. The forms are used in construction of plain and reinforced lintels, exterior walls, and foundation stem walls. The forms remain in place after setting of concrete and shall be protected by an approved interior and exterior finish material.

The Phoenix Systems & Components, Inc. insulated concrete forms consist of hollow core forms of flat expanded polystyrene forms connected with polypropylene tie connector webs.

The forms are available in a standard length of 48", height of 16 inches and two standard widths of 9-1/4 inches and 11-1/4 inches. The two widths have nominal concrete core widths of 5 inches and 7 inches respectively. Vertical and horizontal reinforcing steel, when specified, is placed the forms and is supported by the webs.

**Materials** consist of:

- **Polystyrene:** Nominal 1.50 pcf minimum density.
- **Connector Element Webs:** Injection molded polypropylene form ties are cast into the EPS walls and used to attach interior and exterior finish materials. Webs are spaced 8 inches on center.
- **Concrete:** Standard applications use a minimum 2500 psi at 28 days Concrete of higher strength may also be used. The concrete can be pumped, poured from a truck, by hand, or bucket. A concrete pump utilizing a 5" hose reduced to 3"- 4" diameter using a reducer with a 90° bend at the end is recommended. The concrete shall comply with **s. Comm 21.02(3)(b)** and **s. IBC 1903.1**.
- **Reinforcement:** All steel reinforcement shall be in accordance with **s. IBC 1903.5**.

Each pallet of Phoenix Systems & Components, Inc. insulated concrete forms shall bear a label with the manufacturer's name, and the quality control inspection agency.

## **TESTS AND RESULTS**

The tests and results listed below cover both the **Wisconsin Uniform Dwelling Code, for 1 & 2 family dwellings** and current **IBC** requirements.

EPS panel physical properties meeting the requirements of **ASTM C578** Rigid, Cellular Polystyrene Thermal insulation with individual test methods as follows:

- Density Test; **ASTM C303**, Flexural Resistance; **ASTM C203, Method I, Procedure A**, Compressive Resistance; **ASTM D6817** and **ASTM C165** (Stork® Materials Technology/Twin City Testing Corporation, prepared for Omega Point Laboratories, #30160 04-61046);
- Polypropylene Reinforcing webs were evaluated as follows:
- Screw Withdrawal; **ASTM D1761**
- Lateral Screw Resistance; **ASTM D1761**
- Tensile Strength; **ASTM D638**
- Standard Room Fire Test for Interior Finish Material, prepared by Omega Point Laboratories, Report No. 16720-120198, August 24, 2004 (**UL 1715**).
- Testing for **ASTM C578** on EPS Foam, prepared by Omega Point Laboratories.
- **UL 723** and **ASTM E84** on EPS Foam, prepared by Omega Point Laboratories, Report No. 16720-115004, dated July 23, 2003.
- Screw Withdrawal and Lateral Resistance Testing in accordance with **ASTM D1761**, prepared by PFS Corporation, Report No. 04-29, dated May 20, 2004.

## **LIMITATIONS OF APPROVAL**

**General:** Phoenix Systems & Components, Inc. insulated concrete form is manufactured using 100% modified expanded polystyrene from one of the following manufacturers Plymouth Foam Plymouth Foam and SCA North America.

The **Comm** limitations below are in accordance with the current **Wisconsin Uniform Dwelling Code, for 1 & 2 family dwellings**:

- **Foam Plastic:** Phoenix Systems & Components, Inc. insulated concrete forms system is approved for use with a thermal barrier to separate the blocks from interior spaces in accordance with **s. Comm 21.11(1)**. Where a 1-inch thickness of masonry does not separate the polystyrene blocks from the building interior, including at the top of the wall, a thermal barrier, which has a finish rating of at least 15 minutes, shall be provided.
- 1. Phoenix Systems & Components, Inc. insulated concrete forms are approved for use in combustible non-rated construction in accordance with **s. Comm 21.11**. In one- or two-family dwellings, thermal barriers shall be provided to separate the forms from the occupied space of the dwellings per **s. Comm 21.11**.
- 2. The exterior face of the blocks shall be finished with an approved weather covering and must be protected from ultraviolet light.
- **Structural:** Phoenix Systems & Components, Inc. insulated concrete forms are approved as structural building elements.
- 1. The units are approved for use as concrete forms for basement walls and exterior walls when the resulting concrete core thickness satisfies **Table 21.18-A** for one- or two-family dwellings, or when structural calculations for the product are submitted for review.
- 2. Walls shall be anchored to all floors and roofs. Walls shall be interconnected at corners by embedding and lapping the reinforcement.
- 3. Structures are **limited** to two stories in height plus a basement.
- 4. The forms are approved for use as concrete forms for basement stem walls, and exterior walls when structural calculations are submitted to the department by a Wisconsin registered professional engineer or architect.
- 5. Below grade walls shall be damp-proofed when required by the local building department.
- 6. Damp-proofing and water-proofing materials shall be approved by Phoenix Systems & Components, Inc. and the local building official, and shall be free of solvents that will adversely affect the EPS foam.

**NOTE:** Phoenix Systems & Components, Inc., insulated concrete forms wall system was **not** evaluated for compliance with the thermal requirements of **Subchapter VI, ss. Comm 22.20, 22.21, 22.23, 22.25, 22.27, 22.28, and 22.31** of the current **Wisconsin Uniform Dwelling Code, for 1 & 2 family dwellings**.

The **IBC** limitations below are in accordance with the current **Wisconsin Amended ICC Code**:

- **Foam Plastic:** Phoenix Systems & Components, Inc., insulated concrete forms system is approved for use with a thermal barrier to separate the blocks from interior spaces in accordance with **s. IBC 2603.4**.
- 1. In accordance with **s. IBC 2603.4.1.6**, when Phoenix Systems & Components, Inc., insulated concrete forms are used within the attic or crawl space where entry is made only for service utilities, the foam plastic insulation shall be protected against ignition by 1-1/2" thick mineral fiber insulation, a 1/4" thick wood structural panel, particleboard or hardboard, gypsum wallboard, corrosion-resistant steel or other approved material installed so that the foam plastic is not exposed.
- 2. The protective covering shall be consistent with the requirements for the type of construction.
- 3. The crawl space shall not be used for storage or air handling purposes, there are no interconnected basement areas and entry to the crawl space is only for service of utilities.
- **Structural:** Design of concrete formed by Phoenix Systems & Components, Inc., insulated concrete forms must comply with **IBC Chapter 19** with the following requirements:
- 1. The forms are approved for use as concrete forms for basement walls, exterior walls and retaining walls when structural calculations are submitted to the department by a Wisconsin registered professional engineer or architect.
- 2. Design calculations of walls must comply with **s. IBC 1901.2**. Use of the empirical design approach specified in **s. 2109.1 [Comm 62.2109(1)]** is prohibited.
- 3. Design of lintels shall comply with the applicable provisions of **IBC Chapter 16**.
- 4. Wall loading shall be in accordance with **IBC Chapter 16**.
- 5. Minimum wall reinforcement shall conform to **s. IBC 1901.2**. When the code requires that vertical and horizontal reinforcement be spaced no further apart than 18 inches or three times the wall thickness, whichever is less, the maximum concrete wall thickness along the length of the wall is permitted to be used to determine rebar spacing.
- 6. Walls shall be anchored to floors and roofs in accordance with **s. IBC 1604.8.2**. Walls shall be interconnected at corners by embedding and lapping reinforcement in accordance with the code.
- 7. Design of shear walls shall be in accordance with **ss. IBC 1901.2 and 1910**.

8. Structures are **limited** to two stories in height plus a basement.
9. Below grade walls shall be damp-proofed when required by the local building department, water-proofed in accordance with **s. IBC 1806**.
10. Damp-proofing and water-proofing materials shall be approved by Phoenix Systems & Components, Inc., and the local building official, and shall be free of solvents that will adversely affect the EPS foam.
11. Special inspection is required as noted in **s. IBC 1704**, for placement of reinforcing steel and concrete, and for concrete cylinder testing, except that special inspection is not required for foundation stem walls conforming to **Table 1805.4.2** of the **IBC**. Additionally, when the building official approves, special inspection is not required when all of the following conditions are met:
  - a) Wall systems are a maximum of 8 feet high and are limited to use in single-story construction of Group R-3, or Group U Occupancies.
  - b) Maximum height of a concrete pour is 48 inches. Succeeding lifts must be placed in accordance with **s. IBC 1905.10**.
  - c) Installation is by properly trained installers approved by Phoenix Systems & Components, Inc.
  - d) The installation instructions indicate methods used to verify proper placement of concrete.
12. Walls constructed with Phoenix Systems & Components, Inc., insulated concrete forms blocks, is considered Type V Construction.

**NOTE:** Phoenix Systems & Components, Inc., insulated concrete forms wall system was **not** evaluated for compliance with the thermal requirements of **s. Comm 63.1018**.

**Alternate Design:** In lieu of calculations, the structural design of reinforced concrete formed by Phoenix Systems & Components, Inc., insulated concrete forms wall system for residential construction is permitted to comply with the *Prescriptive Method for Insulating Concrete Forms in Residential Construction* (publication No. EB118), dated May 1998, published by the Portland Cement Association (PCA). Buildings constructed with the Phoenix Systems & Components, Inc., insulated concrete forms wall system and designed in accordance with the alternate design, will not exceed a height of two stories plus a basement, where the maximum unsupported wall height is 10 feet.

**Identification:** Each package bears a label specifying the name and address of the manufacturer Phoenix Systems & Components, Inc. Additionally, product labels indicate the Wisconsin Building Product Evaluation Number (**200433-I**), and the name and logo of the quality control agency.

This approval will be valid through December 31, 2009, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

### **DISCLAIMER**

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: December 29, 2004 By: \_\_\_\_\_

Lee E. Finley, Jr.  
Product & Material Review  
Integrated Services Bureau